CLAIMS

1. A polarization mode dispersion compensator comprising:

a compensating portion which includes a first polarization controller which performs polarization conversion on light propagating along an optical transmission line and a DGD (Differential Group Delay) emulator which adds a DGD to the light which is polarization-converted by said first polarization controller, said compensating portion being for compensating polarization mode dispersion which occurs in the light while the light propagates along the optical transmission line;

a second polarization controller for performing polarization conversion on the light, of which the polarization mode dispersion is compensated, so that a state of polarization of the light can be one linear polarization;

a polarization beam splitting portion for splitting the light, which is polarization-converted by said second polarization controller, into the one linear polarization and an other linear polarization which is orthogonal to the one linear polarization;

an optical-intensity measuring portion for measuring intensity of the other linear polarization; and

a controlling portion for controlling said compensating portion and said second polarization controller so that the intensity of the other linear polarization measured by said optical-intensity measuring portion becomes minimized.

2. The polarization mode dispersion compensator as claimed in claim 1, wherein the DGD emulator of said compensating portion selects an optimal DGD value which statistically exhibits optimal behavior based on a probability density distribution of the polarization mode dispersion of the optical transmission line and

adds the optimal DGD value as the DGD.

3. The polarization mode dispersion compensator as claimed in claim 2, wherein the optimal DGD value is 75% of a maximum in the probability density distribution.

4. A polarization mode dispersion compensating method comprising the steps of:

compensating for polarization mode dispersion which occurs in light which propagates along an optical transmission path by performing polarization conversion on the light and adding a DGD to the light;

performing polarization conversion on the light of which the polarization mode dispersion is compensated, so that a state of polarization of the light can be one linear polarization;

splitting the light, which is subjected to polarization conversion, into the one linear polarization and an other linear polarization which is orthogonal to the one linear polarization;

measuring intensity of the other linear polarization; and

controlling said step of compensating and said step of performing polarization conversion so that the intensity of the other linear polarization measured at the step of measuring becomes minimized.

5. The polarization mode dispersion compensating method as claimed in claim 4, wherein addition of the DGD is performed by selecting an optimal DGD value which statistically exhibits optimal behavior based on a probability density distribution of the polarization mode dispersion of the optical transmission line to add the optimal DGD value as the DGD.

6. The polarization mode dispersion compensating method as claimed in claim 5, wherein the optimal DGD value is 75% of a maximum

in the probability density distribution.

7. A polarization mode dispersion compensator for compensating for polarization mode dispersion that occurs in an optical signal propagating along a transmission line, comprising:

a polarization controller for performing polarization conversion on the optical signal input via the transmission line;

a fixed PMD (Polarization Mode Dispersion) emulator for adding a fixed PMD to the optical signal which is polarization-converted by said polarization controller;

monitoring means for monitoring a state of the optical signal output from said fixed PMD emulator; and

controlling means for controlling said polarization controller based on a feedback signal from said monitoring means,

wherein the fixed PMD added by said fixed PMD emulator consists of a fixed first-order PMD and a fixed second-order PMD.

8. The polarization mode dispersion compensator as claimed in claim 7, wherein said fixed PMD emulator is configured by a plurality of polarization maintaining fibers or uniaxial birefringent crystals coupled with a relative angle formed between axes of eigen states of polarization of the polarization maintaining fibers or the uniaxial birefringent crystals.

9. A polarization mode dispersion compensator for compensating for polarization mode dispersion that occurs in an optical signal propagating along a transmission line, comprising:

a first polarization controller for performing polarization conversion on the optical signal input via the transmission line;

a first fixed PMD emulator for adding only a fixed first-order PMD to the optical signal which is polarization-converted by said first polarization controller;

a second polarization controller for performing polarization conversion on the optical signal output from said first fixed PMD emulator;

a second fixed PMD emulator for adding only a fixed second-order PMD to the optical signal which is polarization-converted by said second polarization controller;

monitoring means for monitoring a state of the optical signal output from said second fixed PMD emulator; and

controlling means for controlling said first polarization controller and said second polarization controller based on a feedback signal from said monitoring means.

10. The polarization mode dispersion compensator as claimed in claim 9, wherein said first fixed PMD emulator is one polarization maintaining fiber or one uniaxial birefringent crystal.

11. The polarization mode dispersion compensator as claimed in claim 9, wherein said second fixed PMD emulator is configured by three or more polarization maintaining fibers or uniaxial birefringent crystals coupled with a relative angle formed between axes of eigen states of polarization of the polarization maintaining fibers or the uniaxial birefringent crystals.

12. The polarization mode dispersion compensator as claimed in claim 11, wherein a fixed polarization converter is arranged between any two components of said second fixed PMD emulator, said polarization converter having a function of polarization conversion such that a first-order PMD of said second fixed PMD emulator is zero.

13. The polarization mode dispersion compensator as claimed in claim 7 or 9, further comprising temperature adjusting means for adjusting temperature of said first fixed PMD emulator or said

second fixed PMD emulator.

14. The polarization mode dispersion compensator as claimed in claim 7 or 9, wherein a second PMD canceller including one polarization controller and one polarizer or polarization beam splitter is arranged at a latter part of the polarization mode dispersion compensator.

15. The polarization mode dispersion compensator as claimed in any one of claims 7, 9 and 14, further comprising a fixed PMD emulator having an optimal fixed first-order PMD and an optimal fixed second-order PMD which statistically exhibit optimal behavior based on a probability density distribution of the polarization mode dispersion of the transmission line.

16. An optical communication system comprising the polarization mode dispersion compensator according to claim 2, 5 or 15.